

Extending the Space Science Data Environment through Semantics and Knowledge Representation

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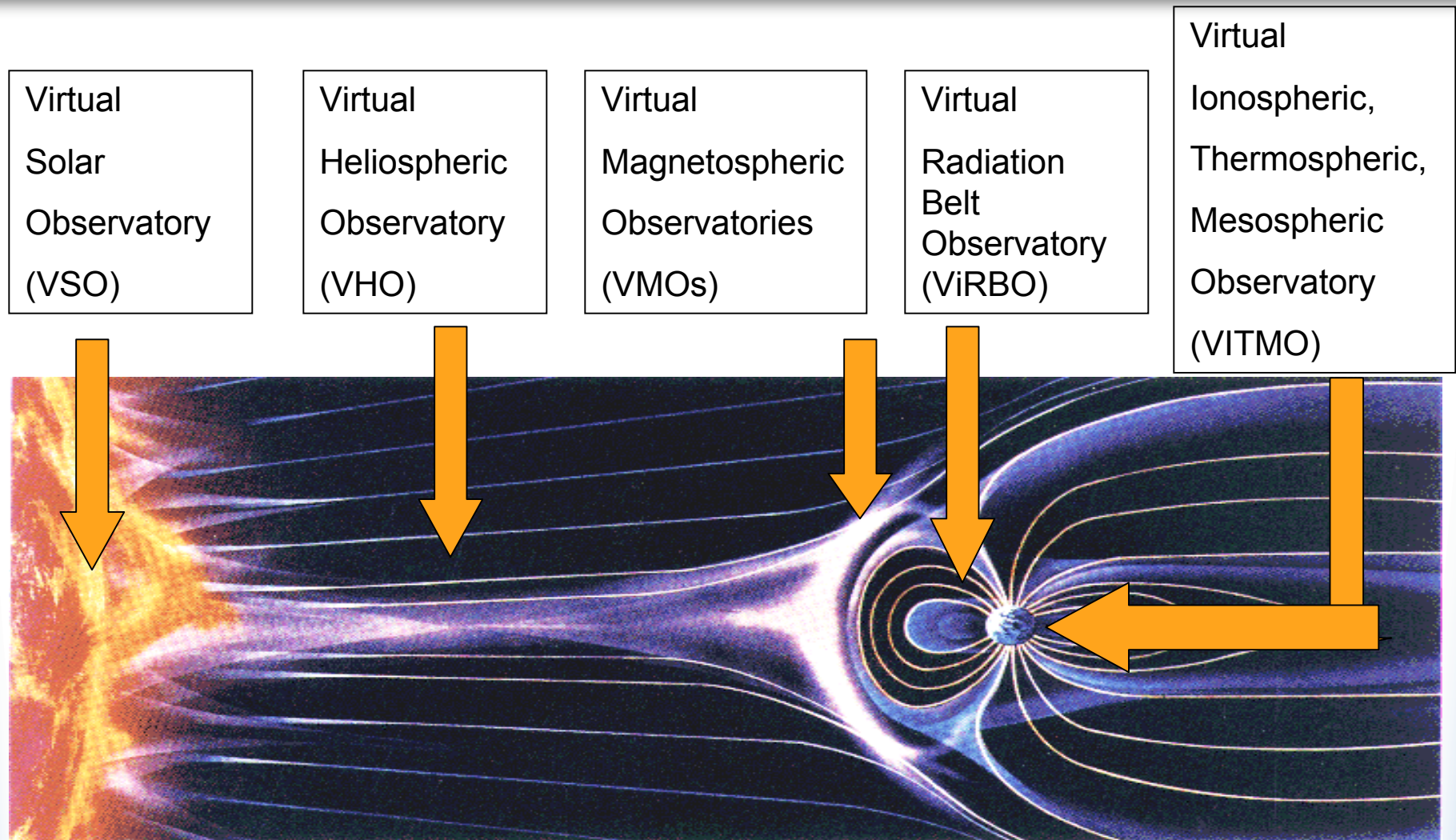
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What is a Virtual Observatory?

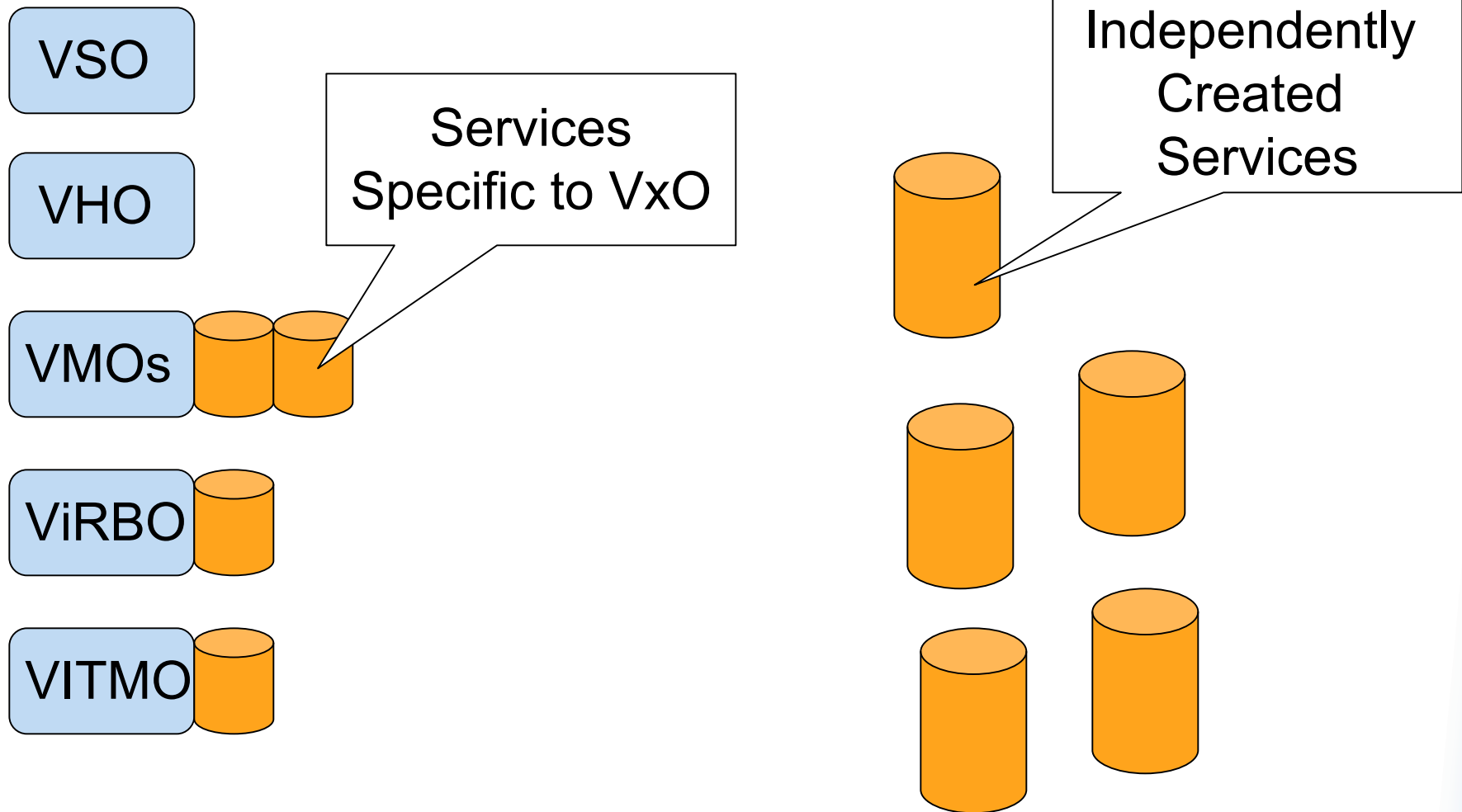
- The next phase of NASA's Heliophysics Data Environment
- A suite of software applications on a set of computers that allows users to uniformly find, access, and use resources (data, software, document, and image products and services using these) from a collection of distributed product repositories and service providers.

- *D. Aaron Roberts*: presented October, 2004, Greenbelt, MD.

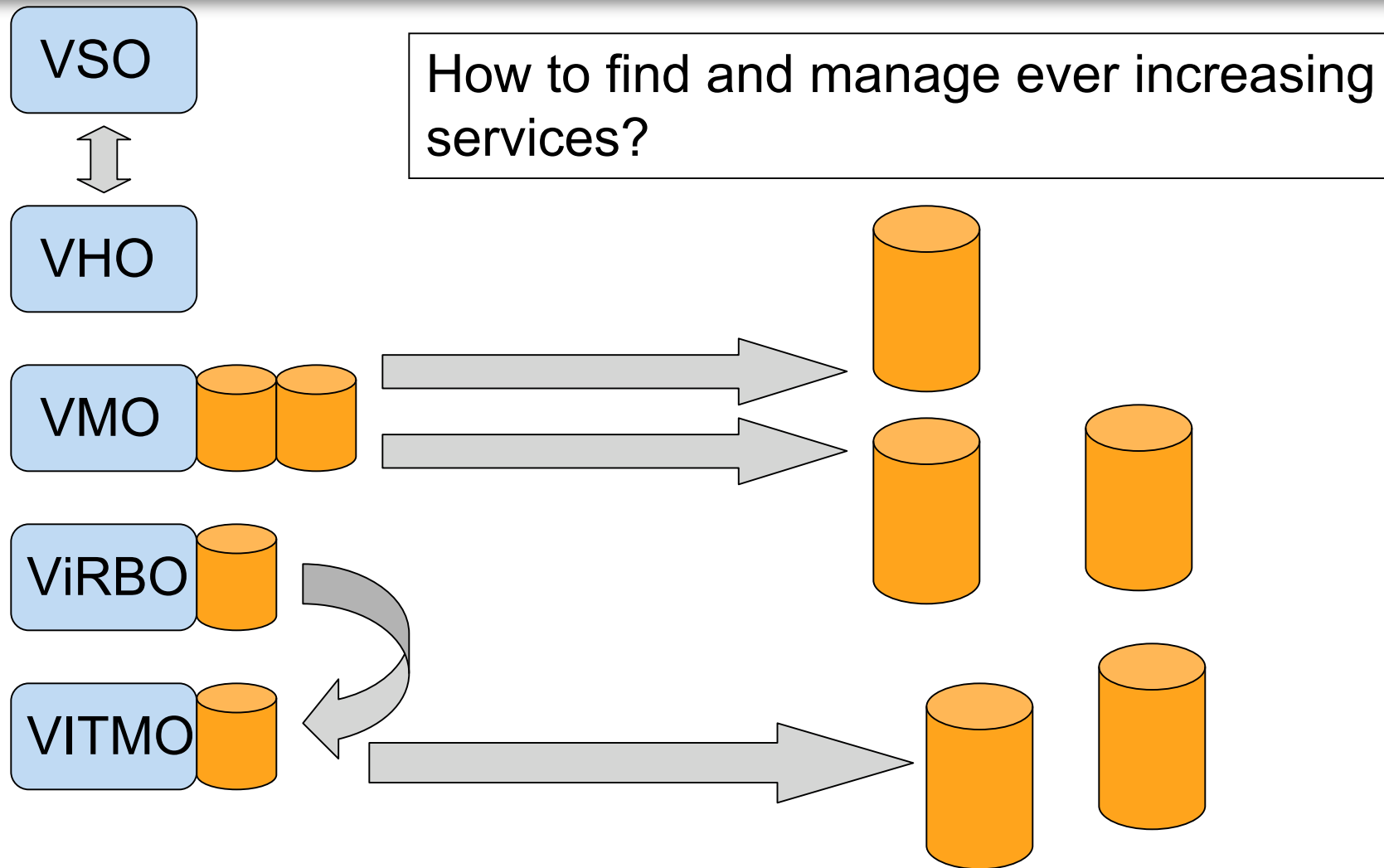
Current Situation – NASA VxOs



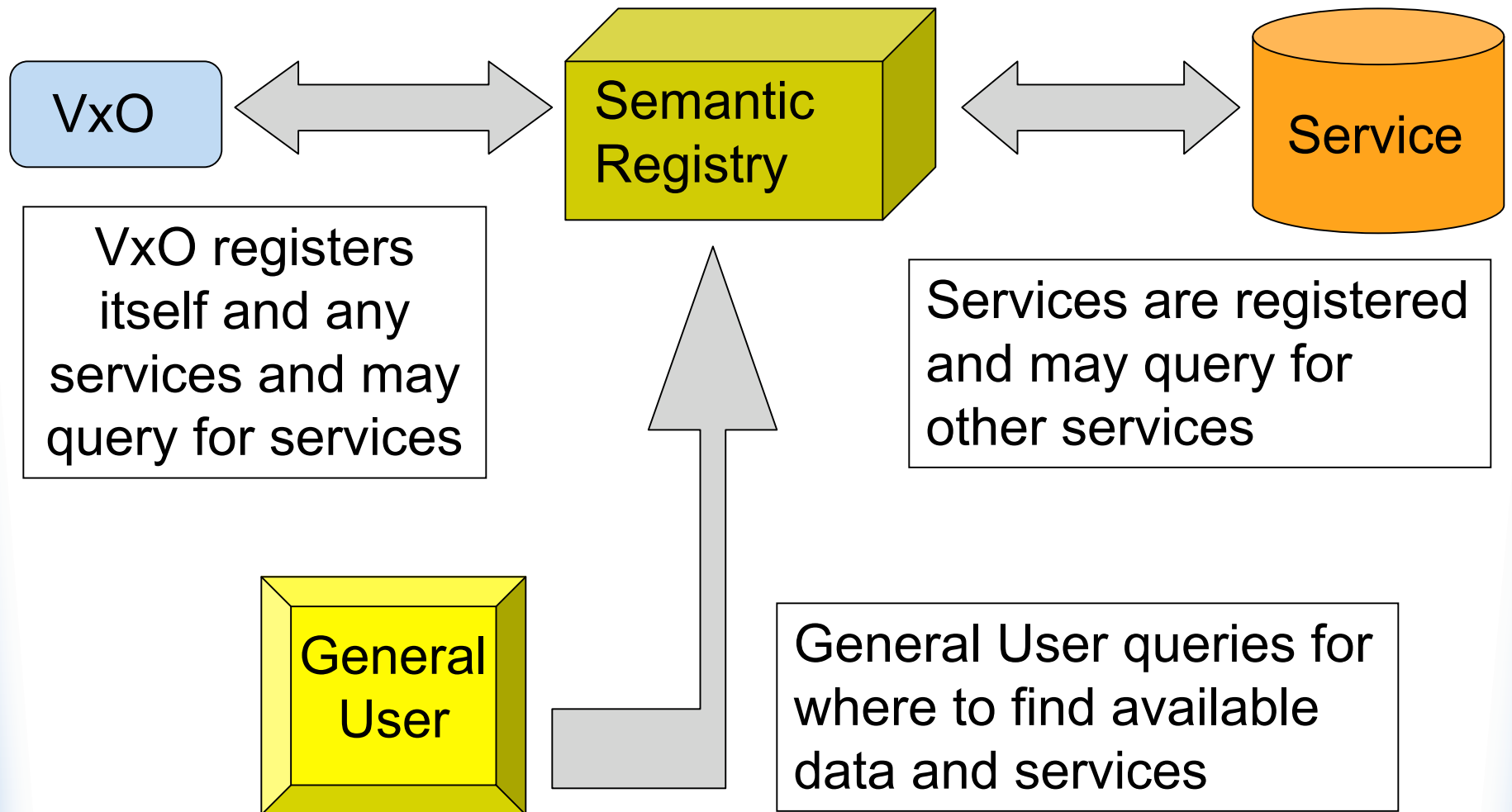
The Problem



The Problem



Semantic Registry



Semantic Registry

- Conducts searches via an ontology
- Has advantages over traditional keyword or categorized searches
 1. Allows for semantic description of inputs/outputs
 2. Allows for more flexibility in searching than otherwise available

The Ontology

- SPASE – Space Physics Archive Search and Extract
- International group preparing a data model of space physics terms and descriptions
- Exists as a model for creating XML metadata descriptions of data, instruments, spacecraft and people.

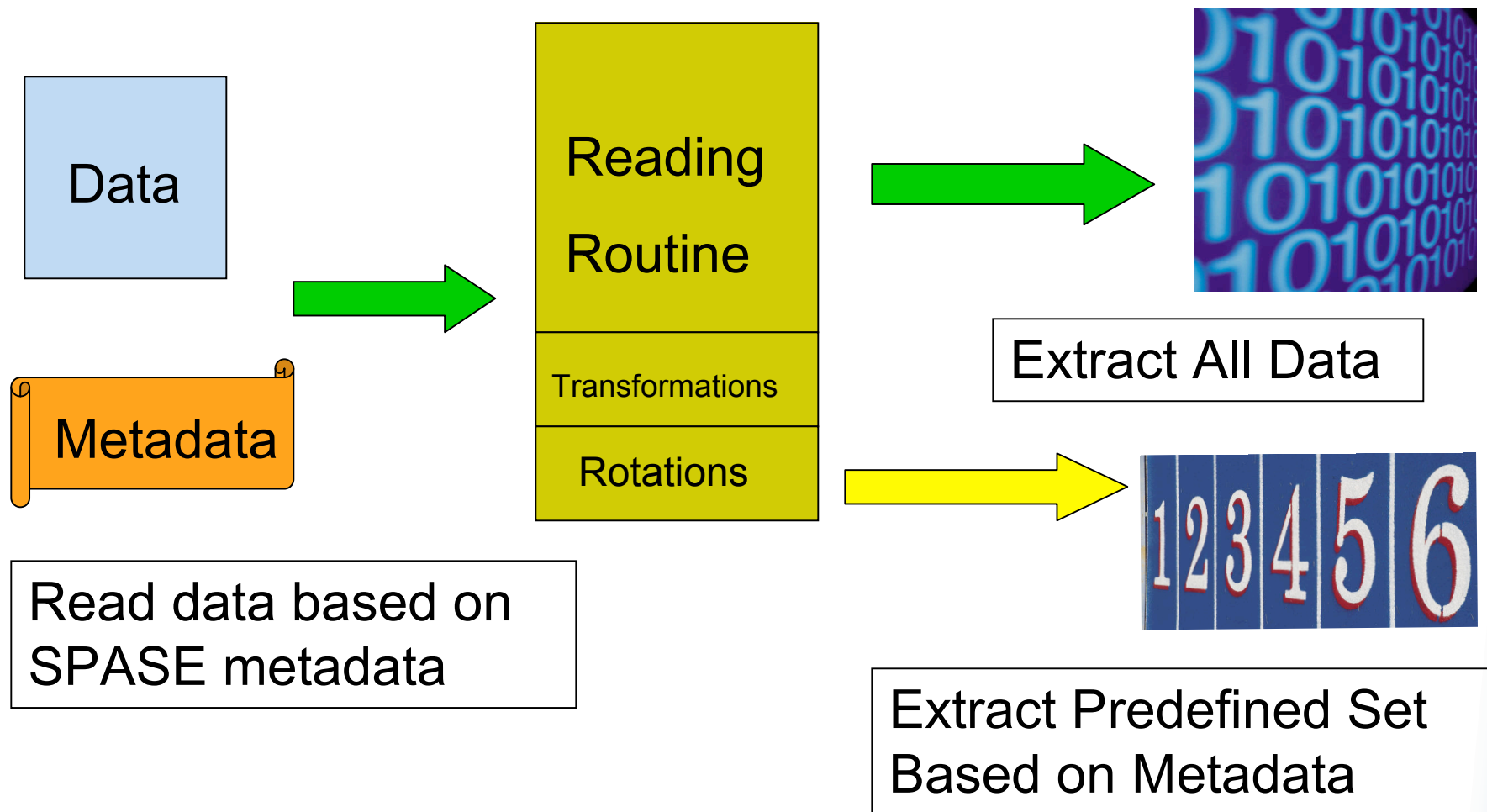
Semantic Registry Results

- Exact Match – Inputs/Outputs exactly match users request
- Direct Relation – request input is less specific or equal, service output is more specific and direct child
- More Specific – request input is less specific or equal, service output is more specific but not direct relation
- Less Specific – request input is less specific or equal, service output is less specific

Example Search

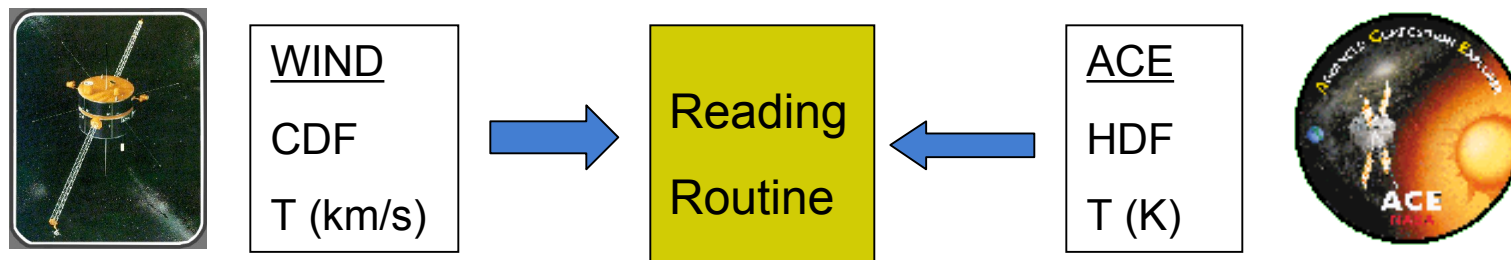
- Epsilon parameter is derived from magnetic field and plasma measurements
- Assume service that calculates Epsilon given Magnetic Field and Plasma measurements
- Registry Request: Input = Magnetic Field/Plasma data, Output = Derived Parameters
- Epsilon calculation service is a Direct Relation match

Tool for Service Providers

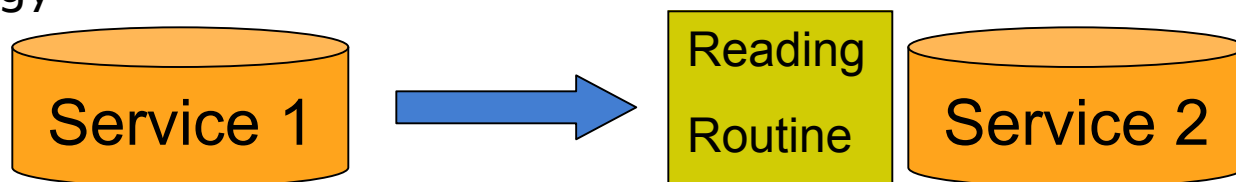


Tool Continued

- General Scientific Use: One reading routine for all data
- Data is immediately comparable and usable



- Works well for workflows and chaining of services
- Currently rules and transformations are hard-coded, move toward ontology



VxO Participation

- Working with Virtual Heliospheric Observatory (VHO) and Virtual Magnetospheric Observatory (VMO)
- Registering VxO and associated services
- Using registry from within VxO

Summary and Status

- Finalizing development and testing of semantic registry
- In near future will populate registry and make available to the public
- Developing reading tool and moving towards ontology
- Working with the SPASE community to extend descriptions to include how data is laid out in the file